Ear Worm Control in Sweet Corn[1]

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The corn ear worm, *Heliothis armigera* (Hübner), is a serious pest of corn in the Hawaiian Islands and when it attacks certain varieties of corn the result is essentially a complete loss of the crop. The necessity for a control measure became apparent in the pilot plots planted for the Pineapple Producers Cooperative Association Emergency Committee on Food Production. The method suggested by Barber,[2] using highly refined mineral oils both alone and in combination with pyrethrum, seemed to offer the greatest possibilities for the present purpose and accordingly was tried with some modifications from the originally described method.

The insecticidal materials tested were Oronite Crystal oil (Standard Oil Co. White Oil No. 7) a highly refined mineral oil of 145-155 Saybolt viscosity at 100° F. and an unsulfonated residue exceeding 90 per cent. This oil was applied alone and also with the addition of 0.05 per cent rotenone in the form of derris extract in camphor oil. This latter material is stated by the manufacturer to contain 5 per cent rotenone in a total of 20 per cent extractive, dissolved in camphor oil. Thirty-six cubic centimeters of this material added to one gallon of oil gives a mixture of 0.05 per cent rotenone content.

The oil was applied by means of an ordinary mechanic's pressure oiler which was obtained from a local automobile supply house. This was calibrated by inserting a small copper ring beneath the plunger to limit the material ejected to 0.8 cc. with each depression of the plunger. This oiler is shown in Fig. 1. While this device was adequate for experimental purposes, it would be necessary to modify it by the addition of a supply unit to obviate the necessity for frequent refilling of the supply chamber. The exact form of the oiler is unimportant save that it deliver a constant volume irrespective of the quantity remaining in the supply reservoir.

The oil was placed on the silk as near to the tip of the ear as possible. The oil drops spread very quickly on contact with the silk and seep into the inner silks of the ear and any larvae therein are killed when the oil comes in contact with their body surfaces.

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[2] Barber, Geo. W. 1940. The use of oil containing pyrethrins for ear worm control in sweet corn. U.S.D.A. Bur. of Ent. and Plant Quar. Mimeo. Circ. E 497.

The resistance of larger larvae is probably due to insufficient contact with the oil. It was noted that the larger larvae tended to crawl out of treated ears, probably because the oil rendered the silks unpalatable. There was a distinct temporary flavoring by the camphor of the tips of the ears where the derris extract was used but this disappeared and was no longer detectable either to taste or smell after the third day. No other effect of the insecticide was apparent on any of the treated plants.

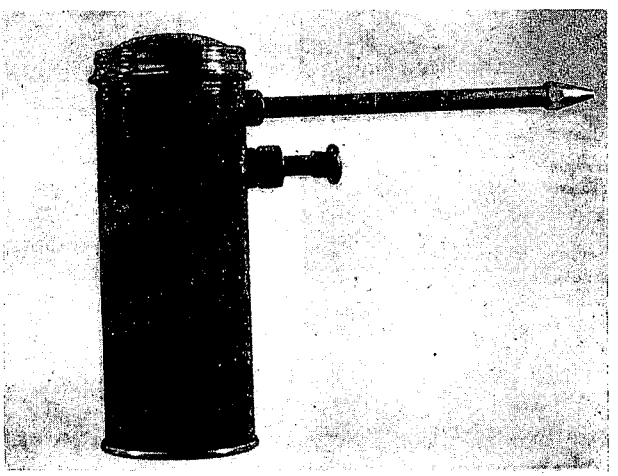

Fig. 1. Mechanic's oiler used for applying oil to corn silk.

The application of oil to the silks of corn is known to interfere with pollination so that it is essential to delay treatment until the silks are no longer functional. Dependent somewhat on weather conditions, pollination is completed within three days after the silks are first exposed at the tip of the ear. Once the kernel is fertilized the silk serves no further purpose and oils can be applied without danger of damage. In actual practice the wilting of the silk is the best indicator of the time to proceed with the control measure. If the stand is maturing uniformly a single treatment of the field may suffice though if some plants are delayed, a second treatment may be required for the retarded ears. The oils are definitely more effective in killing early instar larvae so that too great a delay in time of treating may allow larvae to mature to a point where damage may be expected despite attempted control.

The corn treated in the present experiment was U.S.D.A. Sweetcorn No. 34 growing in a pilot plot of the California Packing Company at Kemoo Farm, Oahu. Treatments were made on February 26, 1941, and 2 weeks later the roasting ears were harvested,

brought into the laboratory and examinations made for living larvae and extent of damage. A distinction was made between perfect ears and those with larvae present but no damage done to the ear. However, from the standpoint of marketability the consumer would not object to small larvae which might be present in the silks. The results are shown in Table 1. The oil plus derris extract treatments are shown to give a superior control by nearly 4 per cent which is a sufficient differential to merit its use.

SUMMARY

The use of white mineral oils either alone or with the addition of rotenone in the form of derris extract gave a satisfactory control of the corn ear worm when applied to the wilted silks with a mechanic's oiler. Damage to the extent of 10.6 per cent occurred where oil alone was used, 6.2 per cent where derris extract was added as compared to 60.8 per cent in the untreated checks.

TABLE 1.

Results of treatment of corn ears with Crystal oil and Crystal oil plus 0.05 per cent rotenone in the form of derris extract

	Crystal Oil	Crystal Oil Derris Extract	Untreated Check
Total number of ears	104	97	51
Perfect ears, no larvae	85	88	5
Larvae present but no damage	8	3	15
Larvae present, tip damage	11	6	31
Per cent perfect ears	81.7	90.7	9.8
Per cent marketable ears	89.4	93.8	39.2
Per cent tip damage	10.6	6.2	60.8